



# Workshop on High-Resolution Coupling and Initialization to Improve Predictability and Predictions in Climate Models

NOAA Center for Weather and Climate Prediction, College Park MD

September 30<sup>th</sup> – October 2<sup>nd</sup>, 2015

## Agenda

### Day 1

8:30 am-8:45 am **Welcoming Remarks, Scope of the Workshop and Relevance to NOAA and DOE**

8:45 am-12:30 pm (25 minute break) **Session 1: Setting the Stage - Tag-team talks and discussions on current state-of-the-science**

Chair: Franco Molteni (TBC)

Rapporteurs: Volunteers from the SC

- Team 1: State of the science in seamless predictions sub-seasonal to seasonal – [Leads: Jim Kinter, Shian-Jiann Lin]
- Team 2: State of the science in using initialized climate models for testing model physics and understanding model processes and biases [e.g. CAPT] – [Leads: Brian Medeiros, Travis O'Brien and Steve Klein]
- Team 3: Current initialization capabilities – [Leads: Kevin Raeder, Steve Penny]
- Team 4: Computational and infrastructure environment in the next 5 years and the limits on high resolution initialized simulations [Leads: Bill Putman, Brian Gross (TBC) and Bill Collins]

[Each Team will give a 30 min collective team presentation followed by a 20 min Q&A. Presentations will include input from interested participants as part of workshop preparations. A bulleted resume of key points from the team presentations will inform the meeting report]

12:30 pm-1:30 pm Lunch

1:30 pm - 5:00 pm (30 minute break) **Session 2: The nexus: Resolution – Processes – Prediction skill**

Organized/Chaired by Team 1 Leads and one Lead from Team 4

Rapporteurs: Team 1, 4 Reps

- How does prediction skill and fidelity change when resolution is increased in combination for the various components of the prediction system?
- How can we diagnose and address model behaviors that lead to the sensitivity?
- Are there specific or related processes in the coupled system that drives both prediction error in the short term forecast and climate simulation bias?
- What resolutions are necessary to adequately resolve these processes?

These should be discussed in the context of state-of-art HPC computing and data storage systems available to the U.S. community in the next 5 years.

[The session will include 3 presentations (20 min each) followed by discussion. Team 1 Leads will propose presentation titles/speakers to address the key topics of the session, above. A bulleted resume of key outcomes will inform meeting report].

6:00 pm **Informal Dinner at Franklins Restaurant**

**Day 2**

8:30 am - 12:00 pm (30 minute Break) **Session 3: Frameworks for Diagnosing Fast Physics in the Coupled System**

Organized/Chaired by Team 2 Leads and one lead from Team 4

Rapporteurs: Team 2, 4 Reps

- For what phenomena would initialized coupled models [e.g. coupled CAPT] be of use for diagnosing fast physical processes of climate system?
- What can initialized simulations (either single component or coupled) reveal about fast coupled processes, such as rapid development of flux errors that lead to long-term bias and prediction error for the climate system?
- What timescales should be targeted by such efforts?

[The session will include 2 presentations (20 min each) followed by discussion. Team 2 Leads will propose presentation titles/speakers to address the key topics of the session, above. A bulleted resume of key outcomes will inform meeting report].

12:00 pm -1:30 pm Lunch

1:30 pm – 5:00 pm (30 minute Break) **Session 4: Initialization at HR and Uncertainty Sampling for Sub-seasonal to Seasonal Prediction**

Organized/Chaired by Team 3 Leads and one lead from Team 4

Rapporteur: Team 3, 4 Reps

- What initialization techniques are best applied for prediction at the various spatial and temporal scales?
- What level of initialization sophistication is useful or necessary for diagnosing fast physical processes in initialized climate model simulations [e.g. CAPT]?
- What is the ideal size of the ensemble needed for this effort both for prediction and for understanding coupled processes and biases?
- What resolution is feasible given the state-of-art HPC systems available to the U.S. community? How will increasingly high-resolution data be stored and shared for community research?

These should be discussed in the context of state-of-art HPC computing and data storage systems available to the U.S. community in the next 5 years.

[The session will include 3 presentations (20 min each) followed by discussion. Team 3 Leads will propose presentation titles/speakers to address the key topics of the session, above. A bulleted resume of key outcomes will inform meeting report].

6:30 pm **Team Leads Working Dinner** (TBC)

**Day 3**

8:30 am-10:30 am **Session 5: Future HR Experimental Frameworks**

Organized by all Team Leads

Chairs: Volunteers from the SC

Rapporteurs: Volunteers from the SC

- What are key points stemming from Sessions 1-4 to inform future experimentation?  
[Rapporteur summary from Sessions 1—4, with focus on science gaps identified (10 mins each)
  - o Is there agreement on the science gaps identified; are there others?
  - o Is there anything relevant to this workshop that have not been considered? ]
- What are the timescales for which there is the most pressing need to improve scientific understanding of resolution-dependent improvements in light of current HPC capabilities?
- Is there a feasible experimental framework to systematically and optimally address major questions about the use of high-resolution in initialized coupled climate models?
- What is the interest of the various institutions in participating?

[This session will be a discussion guided by the session chairs. A bulleted resume of key outcomes will inform meeting report].

[15 minute Break]

10:45 am -11:45 am **Report preparation - Outline, Roles, Tasks and Timeline**

11:45 am -12:00 pm **Closing Remarks and Impressions**